The December 7, 2012 Japan Trench intraplate doublet (M_w 7.2, 7.1) and interactions between near-trench intraplate thrust and normal faulting

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Supplementary Figures S1-S5.

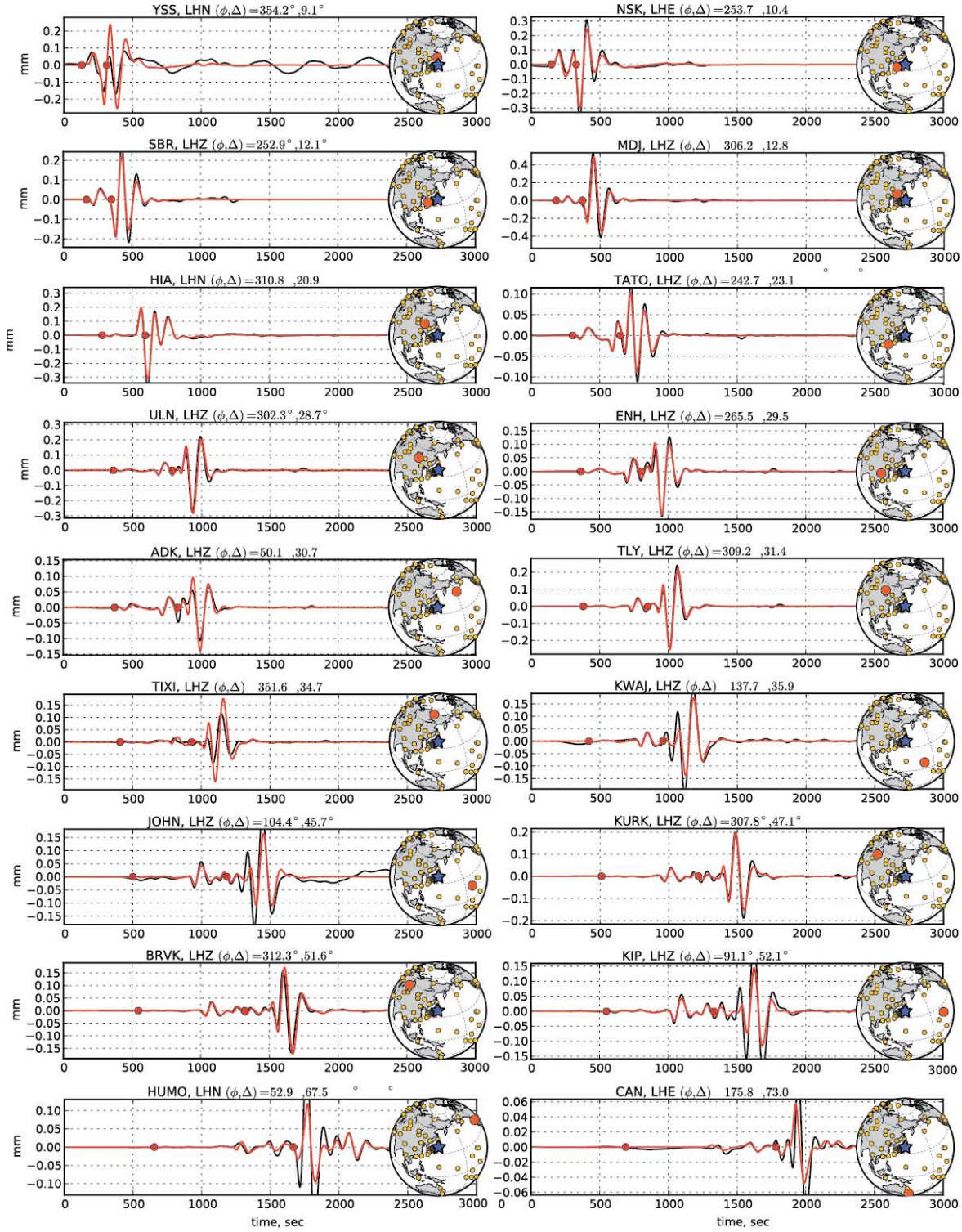

Figure S1. Comparison of observed (black) and synthetic (red) waveforms for the two double-couple W-phase inversion solution shown in Figure 2b. The red dots delimit the W-phase interval. The inset maps indicate the event epicenter (blue star), specific station location (red dot), and position of all stations used in the inversion (gold dots). A total of 130 signals were used in the inversion, this is a representative azimuthal sampling.

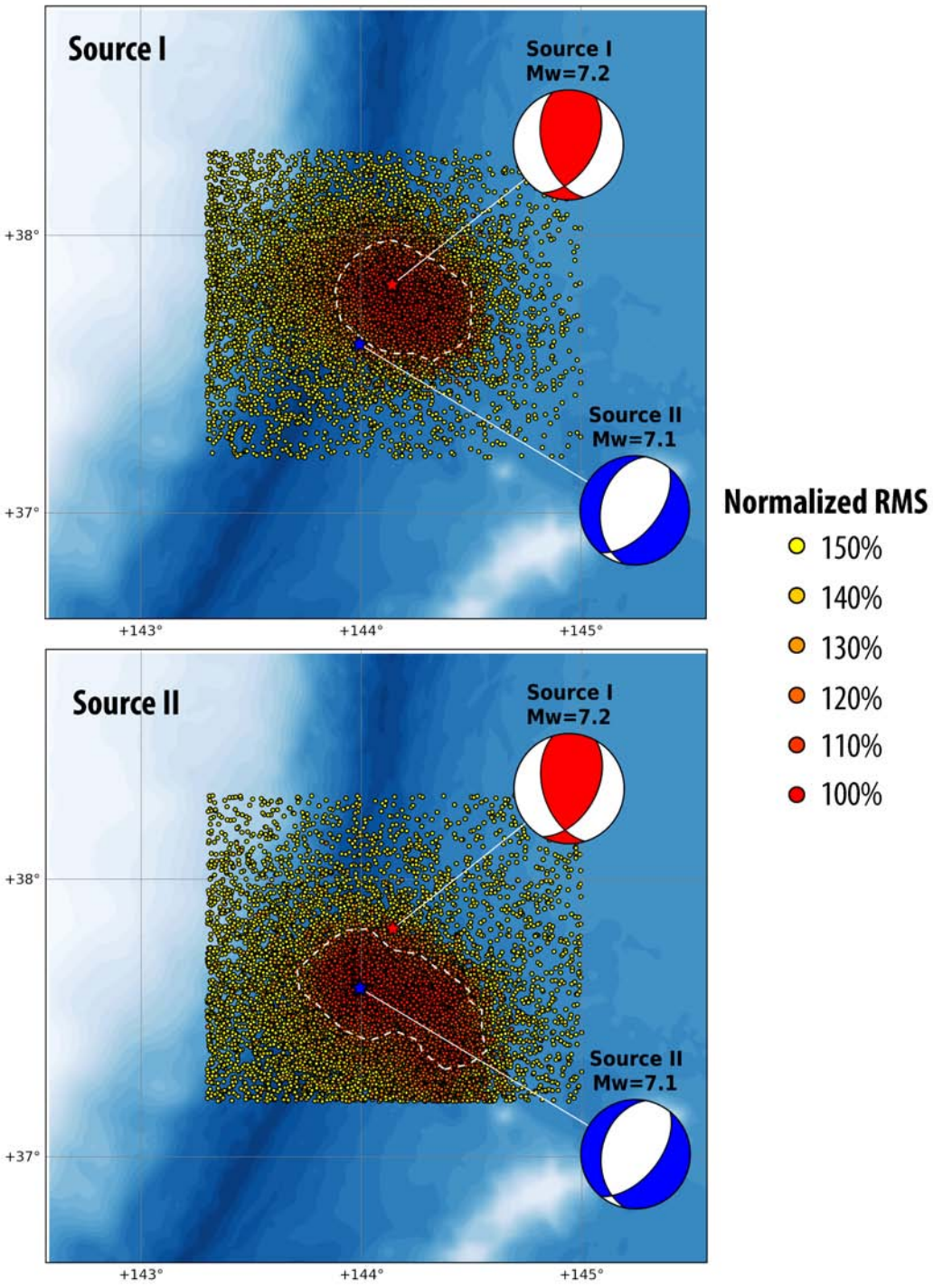

Figure S2. Display of Neighborhood Algorithm sampling of epicentral parameters for the two double couple sources in the W-phase inversion, with the variation in inversion RMS relative to the best-fitting solution (stars) indicated by the color scale. The white dashed curves outline the spatial domain containing solutions found to have less than 10% increase in RMS relative to the minimum values located at the red and blue stars. This is a threshold we find compatible with acceptable waveform fits. This set of sampling is for fixed relative depths of the two subevents. Sampling variation over differential centroid time, absolute centroid depths, and differential centroid depths were also conducted.

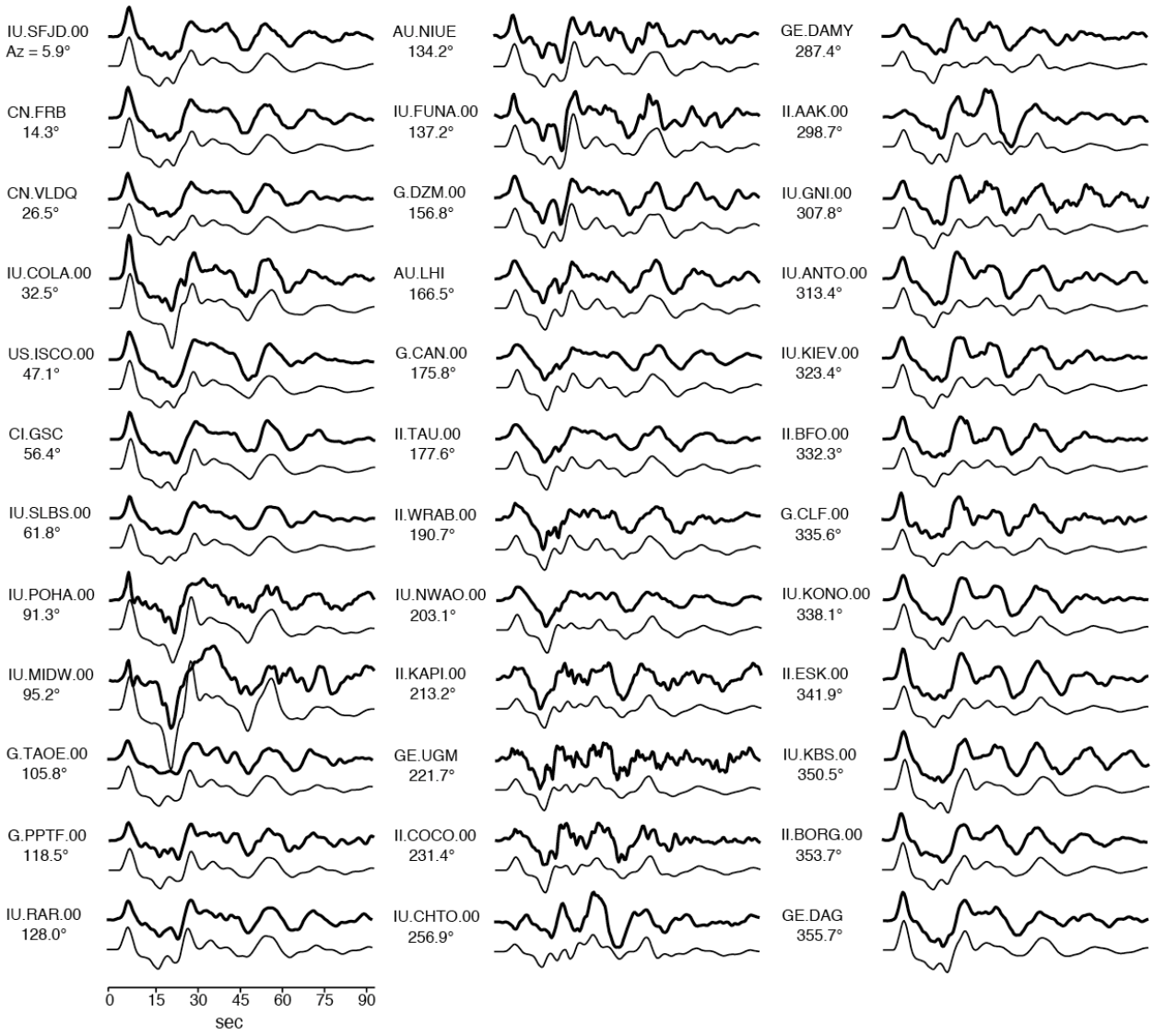

Figure S3. Comparison of P wave observations (bold lines) and synthetics (thin lines) for the three sub-event iterative inversion shown in Figure 3b. The waveforms are plotted with true relative amplitudes. The station code and azimuth (Az) of each signal are shown. A total of 87 stations were used in the inversion; this is a representative azimuthal sampling.

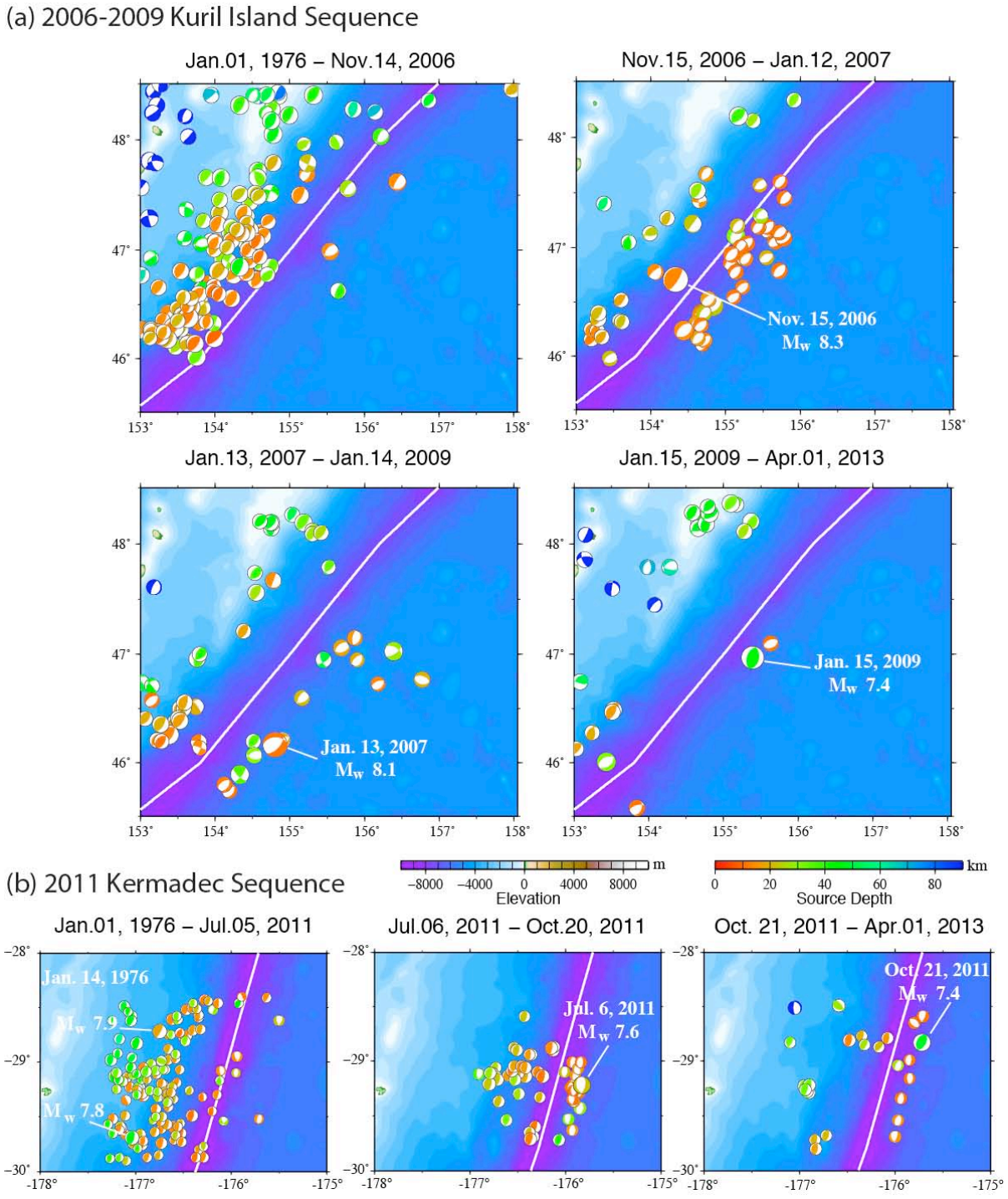

Figure S4. Maps of all gCMT solutions (best-double couples, at centroid locations) for events in (a) the Kuril Islands, and (b) northern Kermadec, with panels high-lighting the major interplate and intraplate events in each of the sequences with deep below-trench thrust events. The Kuril Island activity in (a) is associated with the January 15, 2009 M_w 7.4 thrust event. The Kermadec activity in (b) is associated with the October 21, 2011 M_w 7.4 thrust event.

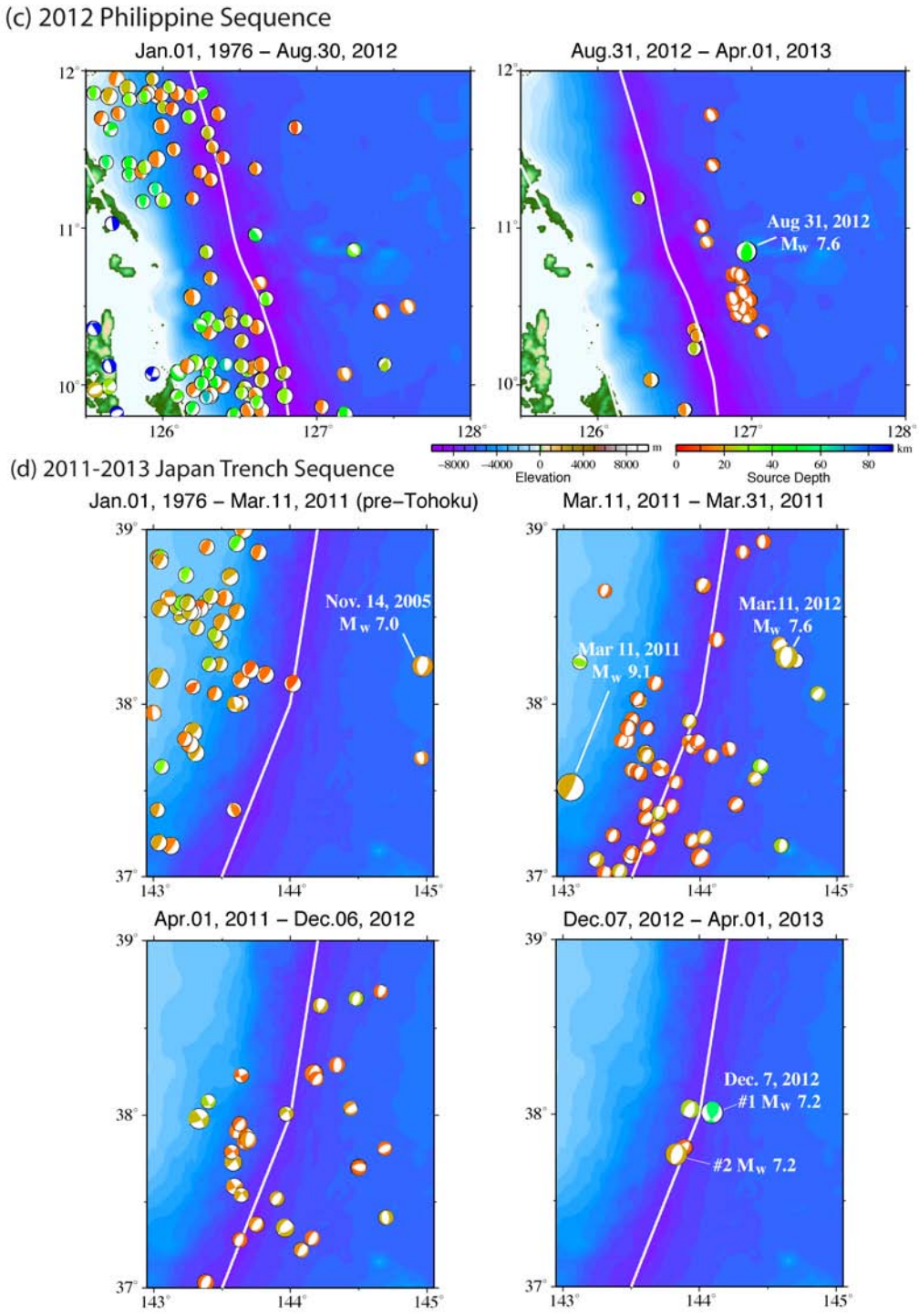

Figure S5. Maps of all gCMT solutions (best-double couples, at centroid locations) for events in (a) the Philippine Trench, and (b) Japan Trench, with panels high-lighting the major interplate and intraplate events in each of the sequences with deep below-trench thrust events. The Philippine Trench activity in (a) is associated with the August 31, 2012 M_w 7.6 thrust event. The Japan Trench activity in (b) is associated with the December 7, 2012 M_w 7.2 doublet event.